

#### Assignment -4

Assignment Date	10 November 2022
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Maximum Marks	2 Marks
Team ID	PNT2022TMID16932

#### **Question:**

Write code and connections in wokwi for the ultrasonic sensor. Whenever the distance is less than 100 cms send an "alert" to the IBM cloud and display in the device recent events. Upload document with wokwi share link and images of IBM cloud.

#### **Code:**

```
#include <WiFi.h>
#include <WiFiClient.h>
#include <PubSubClient.h>
const int trigPin = 27; const
int echoPin = 26;
//define sound speed in cm/uS
#define SOUND_SPEED 0.034
#define CM_TO_INCH 0.393701
long duration; float
distanceCm; float
distanceInch;
void callback(char* subscribetopic, byte* payload, unsigned int
payloadLength);
//-----credentials of IBM Accounts-----

#define ORG "z22obn"//IBM ORGANITION ID
#define DEVICE_TYPE "Assignment-ibm"//Device type mentioned in ibm watson IOT
Platform
#define DEVICE_ID "Sensor"//Device ID mentioned in ibm watson IOT Platform
#define TOKEN "12345678" //Token
String data3;
```

```

//----- Customise the above values ----- char server[] = ORG
".messaging.internetofthings.ibmcloud.com";// Server Name char publishTopic[]
= "iot-2/evt/Data/fmt/json";// topic name and type of event perform and
format in which data to be send

char subscribetopic[] = "iot-2/cmd/test/fmt/String";// cmd REPRESENT command
type AND COMMAND IS TEST OF FORMAT STRING char authMethod[] = "use-
tokenauth";// authentication method char token[] = TOKEN; char clientId[] =
"d:"
ORG ":" DEVICE_TYPE ":" DEVICE_ID;//client id

WiFiClient wifiClient; // creating the instance for wificlient
PubSubClient client(server, 1883, callback ,wifiClient);
void setup()
{
    Serial.begin(115200); // Starts the serial communication
    pinMode(trigPin, OUTPUT); // Sets the trigPin as an Output
    pinMode(echoPin, INPUT); // Sets the echoPin as an Input
    Serial.println(); wificonnect(); mqttconnect();
}
void
loop() {
    // Clears the trigPin
    digitalWrite(trigPin, LOW);
    delayMicroseconds(2);
    // Sets the trigPin on HIGH state for 10 micro seconds
    digitalWrite(trigPin, HIGH); delayMicroseconds(10);
    digitalWrite(trigPin, LOW);

    // Reads the echoPin, returns the sound wave travel time in microseconds
    duration = pulseIn(echoPin, HIGH);

    // Calculate the distance distanceCm
    = duration * SOUND_SPEED/2;

```

```

    // Convert to inches    distanceInch =
distanceCm * CM_TO_INCH;

    // Prints the distance in the Serial Monitor
    Serial.print("Distance (cm): ");
    Serial.println(distanceCm);
    Serial.print("Distance (inch): ");
    Serial.println(distanceInch);

    PublishData(distanceCm);
    delay(1000);    if
(!client.loop()) {
    mqttconnect();
    } }    void PublishData(float Cm) {
mqttconnect();//function call for connecting to ibm
    /*        creating the String in in form JSON to update the data to ibm
cloud
    */
    String payload = "{\"Distance (cm)\":\"";
    payload += Cm;    payload += "\"}";
    Serial.print("Sending payload: ");
    Serial.println(payload);        if
(client.publish(publishTopic, (char*) payload.c_str())) {
    Serial.println("Publish ok");// if it sucessfully upload data
on the cloud then it will print publish ok in Serial monitor
or else it will print publish failed

    } else {
        Serial.println("Publish failed");
    }
    } void mqttconnect() {    if
(!client.connected()) {

```

```

Serial.print("Reconnecting
client to ");

Serial.println(server);    while
(!!!client.connect(clientId, authMethod, token)) {
Serial.print(".");        delay(500);
    }
initManagedDevice();
    Serial.println();
} } void wificonnect() //function defination for
wificonnect
{
    Serial.println();
    Serial.print("Connecting to ");

    WiFi.begin("Wokwi-GUEST", "", 6); //passing the wifi credentials to establish
the connection    while (WiFi.status() != WL_CONNECTED) {        delay(500);
Serial.print(".");
    }
    Serial.println("");
    Serial.println("WiFi connected");
    Serial.println("IP address: ");
Serial.println(WiFi.localIP());
} void initManagedDevice() {    if
(client.subscribe(subscribetopic)) {
Serial.println((subscribetopic));
    Serial.println("subscribe to cmd OK");
    } else
    {
        Serial.println("subscribe to cmd FAILED");
    } } void callback(char* subscribetopic, byte* payload, unsigned int
payloadLength)
{

```

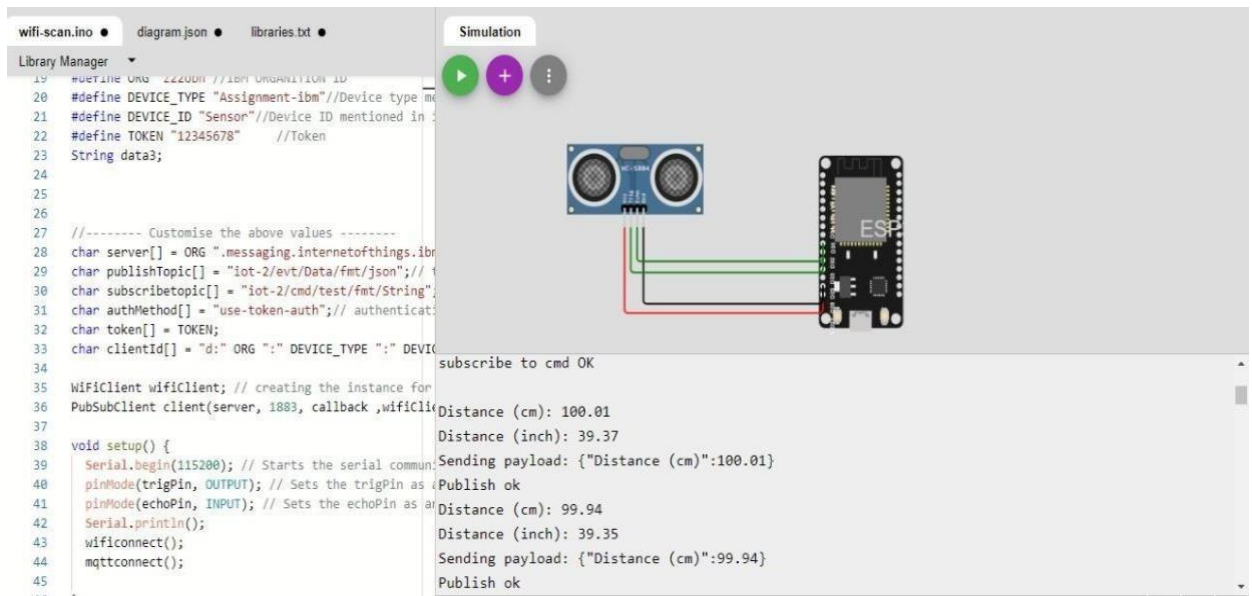
```

    Serial.print("callback invoked for topic: ");
    Serial.println(subscribetopic);    for (int i = 0;
    i < payloadLength; i++) {
    //Serial.print((char)payload[i]);    data3 +=
    (char)payload[i];

    }
}

```

### Wokwi Output:



The screenshot displays the Wokwi simulation environment. On the left, the Arduino IDE code editor shows the following code:

```

19 #define ORG "2220001" //IBM ORGANIZATION ID
20 #define DEVICE_TYPE "Assignment-ibm" //Device type me
21 #define DEVICE_ID "Sensor" //Device ID mentioned in
22 #define TOKEN "12345678" //Token
23 String data3;
24
25
26
27 //----- Customise the above values -----
28 char server[] = ORG ".messaging.internetofthings.ibm
29 char publishTopic[] = "iot-2/evt/Data/fmt/json"; //
30 char subscribetopic[] = "iot-2/cmd/test/fmt/String";
31 char authMethod[] = "use-token-auth"; // authenticat
32 char token[] = TOKEN;
33 char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVI
34
35 WiFiClient wifiClient; // creating the instance for
36 PubSubClient client(server, 1883, callback ,wifiCli
37
38 void setup() {
39   Serial.begin(115200); // Starts the serial commun
40   pinMode(trigPin, OUTPUT); // Sets the trigPin as
41   pinMode(echoPin, INPUT); // Sets the echoPin as a
42   Serial.println();
43   wifiConnect();
44   mqttConnect();
45
46

```

On the right, the simulation window shows a visual representation of the hardware: an ESP8266 microcontroller, an ultrasonic sensor module, and a breadboard. Below the simulation, the output log displays the following messages:

```

subscribe to cmd OK
Distance (cm): 100.01
Distance (inch): 39.37
Sending payload: {"Distance (cm)":100.01}
Publish ok
Distance (cm): 99.94
Distance (inch): 39.35
Sending payload: {"Distance (cm)":99.94}
Publish ok

```

### IBM Cloud Alert:

Event	Value	Format	Last Received
Data	{"Distance (cm)":99.98}	json	a few seconds ago
Data	{"Distance (cm)":99.96}	json	a few seconds ago
Data	{"Distance (cm)":99.98}	json	a few seconds ago
Data	{"Distance (cm)":99.98}	json	a few seconds ago
Data	{"Distance (cm)":99.98}	json	a few seconds ago

**Wokwi Share Link:**

<https://wokwi.com/projects/305569599398609473>